Tower Simulator

Controller's Guide

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INTRODUCTION

How often has this happened to you ? You rush to open Flight Simulator, anxious to begin your flight. You go through whatever portion of pre-flight strikes your fancy, fire your engines, get your clearance and taxi as described to the active, all revved up and ready to take to the air. Only to be told that you're number six for departure. Talk about a let-down!

Well guess what? For a change, you now get to turn the tables and be the bringer of bad news to that anxious pilot. That jet jockey will be at idle until you give him the clearance to advance. You will decide when Roger Ramjet out there will be able to safely enter the active, and it will be up to you to clear him to take off. Nice to have that power in your hands, right?

There's just one small thing, really hardly worth mentioning. All those people out there depend on you, and your next decision may very well result in their flight coming to an abrupt and unexpected ending. Call it right, they're in the air and on their way to their destination, and nobody knows your name. Call it wrong, and suddenly you're on the front page as public enemy number one, with a ton of suits looking for a piece of your time.

Welcome to Tower, the airport traffic control simulator. Your task is simple. Guide aircraft of various sizes and capabilities to and from the active runway for departure and arrival. Direct them as to when it is safe to enter/cross runways, which taxiways they are to use, when to turn or go straight, stop and start, take off and hold short. It should be easy, just look out the window. Of course, it may be dark, or foggy, or be raining so hard you can't see the ground, to say nothing of those two heavies that are getting closer as we speak. Sure, those guys and gals who direct the traffic once airborne have it easy. Plenty of sky in which to push the tin. You, on the other hand have only a limited amount of concrete and a bunch of street signs, along with lots of impatient pilots and passengers who don't want to hear about your problems.

Enjoy Tower Simulator !

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INSTALLATION

INSTALLATION

Installation is automatic. Insert the CD (or double-click on the downloaded file) and Autorun will take you to the start-up screen. If Autorun is disabled on your system, open Windows Explorer or My Computer, browse to your CD-Rom drive and double click "TowerSim_v1x.exe" (x is your version). Before installing it is recommended that you shut down all programs and your virus protection software.
Once setup is running, follow the procedure.

INFORMATION, NEWS, FREQUENTLY ASKED QUESTIONS & UPGRADES :

http://www.towersimulator.com
http://www.wilcopub.com

To fully enjoy **TOWER SIMULATOR**, we recommend the following devices:

TRACK IR : changes pilot's view according to head movements • **VOICE BUDDY** : voice recognition system • **Matrox TripleHead2GO** : allows a true 120° field of view.

Those devices are available from www.towersimulator.com or from your favorite simulator retailer.

Required Computer Settings : 1.4Ghz Processor • Windows® XP SP2 (32bits) - VISTA (32bits) • DirectX 9 or later • 700 Mb hard disk space • 3D video card 256 Mb video card memory • Sound card • Mouse or pointer control device • 512Mb memory for (XP) and 1.0Gb memory (VISTA).

Recommended : • 1.0 Mb memory Windows® XP and 1.5Gb memory for VISTA • 3-D video card 256 Mb video card memory • Two button mouse with a scroll wheel.

The game uses TCP/IP for the instrument communication (ground radar, air radar, command window and strip). These instruments have their own processes ('exe' files) so there will be five programs asking for firewall approval upon first game start: tower.exe (the main game engine), strip.exe, airradar.exe, groundradar.exe and commandwindow.exe.
Regarding the block/unblock dialog: it is an XP SP2 and Vista feature. Windows Firewall, on the first run of Tower, will ask to unblock for the Tower application (Tower.exe is the main game engine) and TCP/IP service (for instruments communication). This is normal. See Windows Knowledge Base article at http://support.microsoft.com/kb/842242 for details.

Frequently Asked Questions

VISTA INSTALLATION
Tower Simulator must be installed with the Administrator rights. After the installation, right-click on Tower shortcut and 'Run as Administrator'.

NO RADAR SCREENS ARE DISPLAYED.
1 - Make sure your video card has 256Mb. 2 - Probably there is a missing file into your PC configuration. Download Visual C++ 2005 Redistributable Package and Visual C++ 2005 Redistributable Package SP1 (exe file dated 2007) freely available from the net.

HOW CAN I IMPROVE THE FRAME RATE ?
Do not select a higher screen resolution than the maximum of your monitor.

HOW CAN I IMPROVE GRAPHICS ?
To improve image quality, increase the ANTI-ALIASING option from your video card settings. Important : increasing Anti-Aliasing decreases performances.

TOWER.EXE HAS ENCOUNTERED A PROBLEM
Download and install the latest DirectX driver from Microsoft site.

THE AIRPORTS

ICAO (IATA) CODE

TNCM (SXM)	Princess Juliana International Airport, St. Maarten Island, Netherlands Antilles
KSNA (SNA)	John Wayne Airport Orange County, Santa Ana, California, USA
LFPG (CDG)	Charles de Gaulle International Airport (Roissy Airport), Paris, France
KORD (ORD)	Chicago O'Hare International Airport, Chicago, Illinois, USA
EDDM (MUC)	Munich International Airport (Franz Josef Strauss International Airport), Munich, Germany

TNCM (SXM)

Princess Juliana International Airport, St. Maarten Island, Netherlands Antilles.

The second busiest airport in the Eastern Caribbean (after Luis Munoz Marin International Airport in San Juan, Puerto Rico), this airport serves as a hub for Windward Islands Airways and is the major gateway for the smaller Leeward Islands. It is one of two airports on St. Maarten, the other on the French side of the island called Grand Case Airport. In 2005, TNCM handled 1,663,226 passengers.

Opened as a military airstrip in 1942, TNCM began its civilian life in 1943. This was the first airport to undergo a private conversion in this area of the Caribbean. The airport has been remodeled and relocated. First in 1964 with a new terminal building and control tower and general facilities upgrades were performed in 1984.

With the rise of popularity of Caribbean destinations and the expected growth of passenger traffic, Princess Juliana International Airport (named after Juliana of the Netherlands, who was crown princess when the airport opened) is once again being modernized. Recently the runway and taxiways have been upgraded; new radar and tower facilities opened in 2004; and a new terminal opened in November 2006. Future plans include extension of the new terminal and construction of a full parallel taxiway system.
The airport is famous for its short landing strip. At 7,152 feet, it is barely long enough for heavy jets. Because of this, aircraft must approach low and slow, right over Maho Beach.

KSNA (SNA)

John Wayne Airport Orange County, Santa Ana, California, USA.

Located in Santa Ana, California, Orange County Airport was renamed in 1979 to honor the actor John Wayne, who lived nearby. It is the sole commercial airport within Orange County, but despite this, General aviation operators outnumber the commercial. There are several facilities at the airport that serve the general and corporate aviation community. In 2007 the airport handled almost 10,000,000 passengers in just over 331,000 aircraft movements.

The main runway, 01L/19R measures 5,700 feet, and is one of the shortest of any major airport in the United States. Aircraft operating here are limited in size to the Boeing 757, although the FedEx A310/300 does operate from KSNA. Carriers operating from KSNA compensate for the very short runway by limiting range, lowering fuel weight and imposing aircraft weight restrictions. The shorter runway 01R/19L, at 2,887' is used primarily by general aviation traffic.

Originally constructed in 1923, KSNA has the distinction of hosting the first commercial drag strip on June 19, 1950. The Santa Ana Drag was started on a runway every Sunday. Due to increased air traffic, it was closed in 1959.

Covering 500.82 acres, the field is 14 miles from Orange County's signature attraction, the Disneyland Resort, as compared to 35 miles for KLAX. A statue of the airport's namesake welcomes passengers at the arrival area on the lower level.

As John Wayne Orange County has only one long runway with a good number of general aviation movements it is a good airport for the controller ready to begin two runway operations.

LFPG (CDG)

Charles de Gaulle International Airport (Roissy Airport), Paris, France.

Welcome to the big leagues.

Located within portions of several communities, including Roissy, 15.5 miles Northeast of Paris; "Roissy" Airport is one of the world's principal aviation centers as well as France's main international airport. LFPG opened as Paris North Airport in 1966 and was renamed Charles de Gaulle International Airport on March 8, 1974. The namesake, Charles André Joseph Marie de Gaullem, was the leader of the Free French Forces during World War II, first President of the French 5th Republic, and a strong supporter for the use of military aviation during World War I.

The architecture of the terminals at Roissy Airport are striking beautiful. Terminal One, the oldest, was designed by architect Paul Andreu. Through the years the passenger spaces have been upgraded and renovated, but still keep their original character. Terminal Two, where Air France is the dominant air carrier, has undergone continual expansion and additions since opening. On May 23, 2004 a section of Terminal 2E's ceiling collapsed killing four and injuring three people.

Currently several additional terminals and satellites are in various stages of completion. The construction of Satellite 3 will provide further jetways for large capacity airliners, specifically the new Airbus A380.

In 2006, LFPG ranked second in Europe and seventh in the world in terms of passenger traffic, with 56,849,567 passengers. In terms of aircraft movements it was number one in Europe with 541,566 landings and takeoffs (7th in the world). 2,130,724 metric tonnes of cargo transited Roissy in 2006, making is number one in Europe and ninth in the world.

The Tom Hanks movie The Terminal is based upon one of LFPG's visitors. Mehran Karimin Nasseri lived in the airport from 1988 till 2006. Mr. Nasseri arrived at the airport legally but was unable to leave as he didn't possess the proper paperwork.

With four runways capable of simultaneous takeoffs and landings a controller must know her/his profession. Busy taxiways, conflicting routes and busy airspace make for a challenging, and rewarding, controlling experience.

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THE AIRPORTS

KORD (ORD)

Chicago O'Hare International Airport, Chicago, Illinois, USA.

Chicago O'Hare International Airport was constructed between 1942 and 1943 as part of a manufacturing plant for the Douglas Aircraft Company to build C-54s. Located next door to Orchard Place, a local community, the airfield was referred to as Orchard Place Airport/Douglas Field, thus inheriting the call sign ORD. The facility was also the site of the Army Air Force's 803 Special Depot. This depot stored many rare or experimental planes, including captured enemy aircraft. These aircraft eventually formed the core of the Smithsonian Air and Space Museum's collection.

As World War II came to an end Douglas Aircraft Company headed for California. The airport was purchased from the United States Government 1946 by the City of Chicago. Additional land was purchased over the next three years. In 1949 Orchard Place Airport was renamed after Lt. Cmdr. Edward "Butch" O'Hare, a World War II flying ace who was awarded the Medal of Honor. O'Hare opened for domestic commercial flights in 1955.

Being situated in the center of the Upper-Midwest and only 17 miles from Chicago, O'Hare is a hub airport for many United States airlines. These airlines include United (terminals one and two) and American Airlines (terminal three). Terminal five sees a all arriving international traffic from airlines such as Aer Lingus, Aero Mexico, Air Canada, Air France, Air India, All Nippon, British Airways, KLM Royal Dutch, Mexicana, SAS, and Turkish Airlines (to name a few).

As the second busiest airport in the U.S and the World, according to Airports Council International 2006 data, KORD is known for it's long delays with just under 76,200,000 passengers in almost 927,000 aircraft movement in 2007. Even so, over the past 10 years O'Hare has consistently been voted one of the Best Airport in North America by the readers of the U.S. Edition of Business Traveler Magazine and Global Traveler Magazine.

There are six pairs of runways arranged in three pairs of parallel sets. The largest is Runway 14R/32L at 13,000 feet. Runways 14L, 14R27R and 28 have Category III ILS capability. All other runways except 4L have full ILS transmitters. Importantly, all but one of O'Hare's runways intersect, and so controllers must wait until a runway is free of traffic before they can clear another plane to use or cross an intersecting runway. Stay sharp, as failing to do this can have disastrous results.

A solid record for safe and efficient controlling at the single and double runway airports simulated in Tower must be established before successfully sitting in the 'hot seat' O'Hare.

EDDM (MUC)

Munich International Airport (Franz Josef Strauss International Airport), Munich, Germany.

Franz Josef Strauss International Airport, or Munich Airport to the locals, transported 30.76 million people in 2006 making it the second busiest airport in Germany, seventh in Europe and 30th in the world. 411,335 aircraft movements in 2006 rank EDDM the 21st in the world. In 2007, Skytrax named Munich the "Best Airport in Europe" for the third consecutive year.

Named in memory of prominent Bavarian politician Franz Josef Strauss, the airport is located 17 miles northeast of Munich. Opening in 1992 after twelve years of construction EDDM replaces the former international Airport in Munich-Reim. The 500 person village of Franzheim was demolished, with residents relocated in the region, in order to create space for the project. The airport is itself within four municipalities: Freising, Oberding (location of the terminals), Hallbergmoos and Marzling. There are currently two runways in operation, with a third under consideration.

Munich Airport serves as a hub for Lufthansa and Star Alliance partners. Terminal One houses most non-Star Alliance airlines. Terminal Two (opened June 2003) is primarily reserved for Star Alliance airlines. A separate General Aviation Terminal serves private and corporate aircraft.

The long and well separated runways allow for simultaneous takeoffs and landings, making Franz Josef Strauss International Airport good challenge for a controller.

RUNWAYS INFORMATION

LFPG	
Runway	**09R/27L**
Width	148 ft
Length	13,780 ft
Surface	Bit/Conc
Runway	**09L/27R**
Width	197 ft
Length	8,858 ft
Surface	Bit/Conc
Runway	**08L/26R**
Width	148 ft
Length	13,829 ft
Surface	Concrete
Runway	**08R/26L**
Width	197 ft
Length	8,858 ft
Surface	Concrete

KORD	
Runway	**04L/22R**
Width	150 ft
Length	7,500 ft
Surface	Asphalt
Runway	**04R/22L**
Width	150 ft
Length	8,075 ft
Surface	Asphalt
Runway	**09R/27L**
Width	150 ft
Length	7,967 ft
Surface	Concrete
Runway	**10/28**
Width	150 ft
Length	10,144 ft
Surface	Concrete
Runway	**14L/32R**
Width	150 ft
Length	10,005 ft
Surface	Asphalt

Runway	**14R/32L**
Width	200 ft
Length	13,000 ft
Surface	Concrete

EDDM	
Runway	**08R/26L**
Width	197 ft
Length	13,123 ft
Surface	Concrete
Runway	**08L/26R**
Width	150 ft
Length	13,123 ft
Surface	Concrete

TNCM	
Runway	**09/27**
Width	148 ft
Length	7,708 ft
Surface	Asphalt

KSNA	
Runway	**01L/19R**
Width	150 ft
Length	5,700 ft
Surface	Asphalt
Runway	**01R/19L**
Width	75 ft
Length	2,887 ft
Surface	Asphalt

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GETTING STARTED

GETTING STARTED

As with anything else, starting small and learning the ropes is always a good idea. With its single runway and limited taxiways Princess Juliana International Airport (TNCM) is perfect for the new controller. This short orientation session will provide only an outline of how control aircraft using Tower. Details on commands, control screens and proper procedures are covered later in the manual.

Setting up Tower for your first controlling session:

On the Main tab choose TNCM and set active runway to 09. For this training session set the local time to 1:00 PM and weather conditions as clear.

Now go to the Settings tab choose the Environment window. Set the ground traffic and traffic density sliders to high.

Return to the Main tab and click the START button.

After the simulation loads you are presented with several windows. Each screen provides you with important information about the activities happening at the airport and surrounding airspace. I'll bet you're thinking, "Now what?" First, check the Arrival/Departure strip (think of this as your "to do" list). At the moment nothing is displayed. While waiting for your first task let's look at the other screens.

The **GROUND RADAR SCREEN** shows all aircraft currently under your control. You press (click on) the + and – buttons on the screen to zoom and widen the range of the radar.

The **AIR RADAR SCREEN** shows all aircraft currently in the airspace and up to 20 nautical miles (nm) from the airport. You press (click on) the + and – buttons on the screen to zoom and widen the range of the radar. Not all planes displayed are under your control – more on this later.

The **COMMAND SCREEN** is your link to the aircraft in your control area. Commands entered here are 'heard' by the pilots. Pilot radio messages are also displayed.

Now let's look out of the control tower windows. Pressing and holding your right mouse button will permit you to move your view of the airport in the main window. Using the mouse wheel or arrow keys will provide you with a binocular feature for a closer look at the action. This is invaluable in preventing those nasty crunching sounds that get the lawyers so excited. It is recommended you print a copy of the airport chart for reference when assigning runways to aircraft and assigning taxi routes.

After exploring your control environment, you should see your first assignment FWI905, Air Carabies flight 905, in the Strip Window (the Aircraft Identification Codes section of the manual for a listing of airline IDs). Avoid the temptation to send FWI905 permission to taxi and takeoff! You cannot send commands to aircraft until they are under your control. For airborne aircraft the pilot will advise, "With you." Aircraft wanting to taxi will have pushed back from the gate (if appropriate) and started engines before announcing to you, "Ready to taxi." After you receive these phrases from the pilot you can control the aircraft's movement. Note: only aircraft you can control are shown on the ground radar screen.

Once FWI905 has called the tower, you now need to get this aircraft from the terminal area to runway 09. Tower allows you to do this in many ways. The simple command is to give permission for the plane to taxi to the runway. The simulation will route the aircraft by the shortest taxi route to the runway you specify. This works well if there isn't much airport traffic or a limited number of taxiways. If multiple aircraft are departing you will need to define the taxi route to avoid conflicts and/or collisions, and is really what Tower is all about.

To start we will command FWI905 the simple way by typing into the command screen, "FWI905 taxi to runway 09." Be sure you enter this command exactly or you will receive a syntax error. If entered correctly FWI905 will acknowledge the taxi clearance and begin moving to the runway. You can watch the taxi through the tower window and on the ground radar screen.

At runway 09 the pilot will hold short and call, "ready for departure." You now need to clear the aircraft for takeoff. Type into the command window, "FWI905 cleared for takeoff." FWI905 will acknowledge, enter the runway and depart. Once airborne, FWI905's tracking will leave the ground radar screen and appear on the air radar.

Once aircraft are in-flight you transfer the flight to departure control. Tower itself controls the flight of in-flight traffic away from the airport. In the real world departure control is the local TRACON's responsibility. Once FWI905 is away from the runway we'll transfer control to departure. To transfer control type into the command screen, "FWI905 contact departure." FWI905 will acknowledge and the aircraft tracking will disappear from the air radar screen, signifying Departure has accepted control of the aircraft.

Congratulations! You have successfully controlled your first taxi and departure!

Now we'll control an aircraft's arrival. On the strip you should see WIA's (Winair) arrival. The strip and radar return will appear at close to the same time. Once seen on the radar screen you cannot give WIA approach instructions. Tower will direct aircraft to short final on the active runway. Only when WIA announces, "with you" are you able control her.

When aircraft contact you it will be on short final. You must confirm that it is safe for the aircraft to land. For this simple introduction you will immediately give WIA permission to land as FWI905 has departed and the runway is clear. Type into the command screen, "WIA cleared for landing runway 09." WIA will acknowledge the clearance. You can observe WIA's movements on the air radar screen, and when close to the airport through the tower windows.

Once WIA has landed the radar return will transfer from the air to the ground radar screen.

While WIA has been on approach two more aircraft have displayed: 232 and WIA630. As WIA will be landing or still be on the runway when 232 announces "with you;" you must tell 232 to go around. To do this type, "232 go around." 232 will acknowledge and fly the go around procedure. If WIA hasn't cleared the runway when WIA630 calls "with you;" you must also send WIA630 around. Be certain to hand them to Departure!

After completing the landing roll and turning off the runway WIA will ask for permission to taxi to the terminal. WIA will not move until you type into the command screen, "WIA taxi to terminal." WIA will acknowledge and taxi using the most direct route to an empty gate. You can follow WIA's progress on the ground radar. Once WIA has stopped at the gate and shut down the engines her radar return will clear from the ground radar screen.

You have now successfully controlled an aircraft's landing a taxi to the terminal. Well done! Bet you think that's all there is to it, right? It just so happens that more

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GETTING STARTED

often than not, there will be more than just one or two aircraft requiring your attention. That's when the fun really starts!

When the airport is busy you will need to give more detailed taxi and airborne commands. The commands available are listed in Commands/Syntax section of the manual. When traffic is heavy it will become important for you to quickly command aircraft. For this reason shortcut keystrokes exist for all commands (except 'VIA'). Be sure to enter a space after each shortcut key stroke or you will get a SYNTAX ERROR.

In addition to the command shortcut keystrokes you can double click on an aircraft's radar return on the radar screens to enter the call sign in the Command Line. A similar shortcut is done by double clicking on the appropriate aircraft's Arrival or Departure Strip. Once the call sign appears in the command line, you may proceed to issue your instructions.

To provide an example from our instruction earlier on how to control an aircraft departure:

After FWI905 announces prepared to taxi, it will not only appear in the History window, but the announcement will be audible as well. Double click on FWI905's Departure Strip or on the aircraft's image on the ground radar screen. Confirm the correct entry in the Command Line. Hit CTRL and 3 followed by a space, and then type the departure runway 09. The command sequence will look like this: FWI905 TAXI TO RUNWAY 09.

For takeoff clearance you will hear, "FWI905 ready for departure." Double click on FWI905's Departure Strip or on the aircraft image on the ground radar screen. Confirm the correct entry in the Command Line and hit CTRL and T. The command screen now shows: FWI905 CLEARED FOR TAKEOFF.

This system of shortcut keystrokes and double clicking on radar or strip screens also works for aircraft arriving at your airport. It is recommended that you print the list of shortcut keystrokes until the key combinations become second nature.

If during play you need a break there is no need to contact a backup controller, just press the PAUSE/BREAK button on your keyboard. Press the PAUSE/BREAK button to resume the simulation.

It is now up to you to control the aircraft at TNCM. You have 232 and WIA630 waiting to land along with WIA435's request to taxi for takeoff. Happy controlling!

To end the simulation simply hit the keyboard ESC key and choose the option to go to the Main Menu. From the main menu you can set up another control situation or close Tower.

TOWER CONFIGURATION

TOWER CONFIGURATION MAIN TAB

Upon opening Tower you will be presented with the Main screen. From here you select which airport to control. After making an airport choice from the pull-down menu (choose one of: Orange County, Chicago O'Hare, Paris DeGaulle, St. Maarten Princess Julianna or Munich airports) you then define by clicking the check-box next to the runways you want to be active. Each airport presents its own unique set of challenges, with perhaps TNCM being the most sedate, progressing to KSNA, EDDM, KORD and LFPG in levels of challenge (and perhaps frustration, but that's the fun part).

Take care in selecting the active runways. Tower will not allow you to select opposing ends of a runway to be active, but you can choose runways that cross or in other ways conflict, and so require careful control for simultaneous landings and departures.

Below the runway selections are the options for time of day and weather. The time listed in the pull-down menu is airport local. The time in-game will be shown as Coordinated Universal Time (UTC).

The right side of the main page contains a brief description of the airport chosen by the Airport Selection dropdown menu.

Clicking "START" will launch you into the Tower simulation.
Clicking "EXIT TO WINDOWS" will close Tower.

Settings Tabs

The Settings screen provides you with the opportunity to change the manner in which Tower will operate on your system. There are four sub-tabs available:

Audio-Video Settings
Here are options for adjusting video and audio components of Tower. Placing the mouse pointer over a setting option will display a brief description of each and how the choices may affect game play.

IMPORTANT: should you happen to select a screen resolution that is higher than the maximum of your monitor, you will greatly reduce your frame rates! If you find your rates suffering, check this first! Either run the sim in full screen mode, or use only the maximum resolution that is supported by your monitor.

NOTE: full screen mode will only function when in-game. The Tower setup screens function only in windowed mode.

Environment
The settings here allow you to balance the level of visual realism and traffic quantity while keeping a level of performance acceptable to you based upon the abilities of your computer system. Placing the mouse pointer over a setting option will display a brief description of each and how the choices may affect game play.

NOTE: By altering the Traffic Density you can increase or decrease the complexity of the simulation.

Commands
Listed are all the traffic control commands used by Tower. Each command may be typed into the Command Screen or entered using the listed shortcut keystrokes. These shortcut settings are outlined in this manual in the Commands/Syntax section.

The shortcut key commands are all customizable to your preference. Double clicking on a command will permit modification. You will receive a warning if attempting to map a previously assigned key sequence.

NOTE: 'VIA' has no shortcut keystroke, nor can one be assigned.

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TOWER CONFIGURATION

Layout
Changing the options here may improve the reaction speed and fluidity of Tower's radar, command and strip screens (more on these later). Each screen's performance may be customized in the following ways: refresh rate, dimension, antialias, and resize. Placing the mouse pointer over a setting option will display a brief description of each and how the choices may affect game play.

'Command Help Available' can be turned off for the command window (see Command Screen section of the manual for details on how the help function operates).

By unchecking 'VISIBLE' the air and/or ground radar screens can be closed and so simulate radar-less procedures.

The layouts pull-down menu allows for pre-selecting the location of the Tower's in-game screens. If you find the screen locations are not to your liking each may be moved by double-clicking the screen and moving the display – this includes moving to a second monitor. A second double-click locks the screen into its new location. The 'last saved' option in the pull-down menu will open Tower with the screens in your custom locations.

INFORMATION TABS

The Information screen provides details on a players controlling history, the operational characteristics of simulated aircraft and on Tower's development and version. There are three sub-tabs available:

User Information
In this window you can create multiple player personalities.
New Card – using this tab you can name each Tower player in order to track his/her controlling history.
Delete Card – use this tab to remove a player's history.
Default 1/2/3/4 - choose a picture to represent each controller personality you create.
Salary – as a player's ATC experience increases she/he will increase their ATC level and receive pay increases. How much money are you worth?
Time Spent Controlling – the time you spend controlling in the simulation.
Number of Landings/Takeoffs – these numbers start at zero when a player personality is created.
Controller Level – the longer each player runs the tower and safely conducts airport operations his/her ATC level increases (see incidents, time spent controlling, number of landings/takeoffs, and salary).
Number of Incidents – this is a tabulation of those incidents when safe controlling policies and procedures were violated (see error descriptions).
Awards
• 10 hours without accident/incident.
• 50 hours of total ATC.
• 10 hours at each airport.
• 100 hour without any accident.

Types of controller errors
• RUNWAY INTRUSION! You've allowed an airplane to cross an active runway while another was taking off or landing.
• SEPARATION ERROR! Two airplanes under your control came closer than 5 miles horizontal separation and/or their vertical separation was less than 1000 feet.
• COLLISION! Two airplanes under your control have collided.

Aircraft
A knowledgeable controller understands each aircraft's takeoff, climb, descent and landing capabilities in order to avoid asking a pilot to perform a maneuver that is outside of the parameters of his aircraft. Doing this only annoys the pilot and does nothing to build his confidence in your controlling abilities.

About
You can review Tower's version, development team and copyright information.

THE SCREENS

THE SCREENS

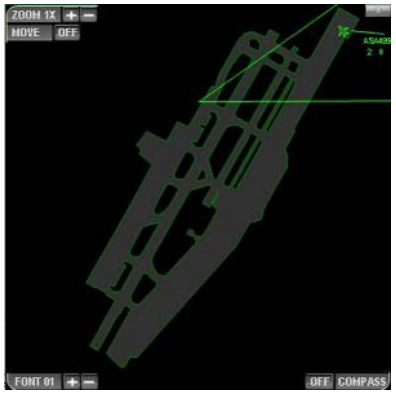
In order to adequately get your charges to and from parking and jetways, you need to have a very good understanding of your airport environment, not only as a static picture of the layout, but in real time as well. With this in mind, in the Airport Charts section of the manual you are provided full page airport charts showing labeled runways and taxiways. It is a good idea to print these and have them available at all times for those instances in which you lose your orientation while looking out the window.

For real time information you are provided with two radar screens: ground and air. Each may be manipulated to increase your level of situational awareness. The Radar and Arrivals/Departures screens interact with the Command Screen in an important and time-saving manner. Double clicking on a specific Arrival or Departure aircraft tag listed will cause that aircraft's call sign to appear on your command line, thus avoiding the need to type in the sign manually. Likewise, double clicking on an aircraft icon visible on your radar screens will place their call sign on the Command line, giving you a nice shortcut that greatly speeds your ability to communicate with your aircraft.

GROUND RADAR SCREEN:
This screen is invaluable as it gives you an overhead view of your entire ground controlling area. The controlled aircrafts locations are updated in real time.

Each aircraft is displayed with an ID tag. The font size used to represent the aircraft ID information can be increased and decreased by clicking on the plus and minus buttons. The tag itself is movable by a click and drag using your pointing device.

Information shown about each aircraft are:
AIRCRAFT ID
ALTITUDE | AIRSPEED
• Altitude: 100's of feet (ex, 2 = 200 feet)
• Airspeed: 10's of knots (ex, 2 = 20 knots)



By clicking the zoom + and - buttons the overall view of the airport can be increased and decreased.

The Move On/Off button allows the controller to manipulate the view shown on the screen. Once enabled, simply left click and drag the view on the screen to scroll left or right to see all of the airport runways and taxiways.

The **compass indicator (CI)** overlays the radar screen is represented with a 'V' symbol. As you change the viewpoint and zoom level in the tower window using your pointing device, the CI will represent this viewpoint on the radar screen. The CI may be turned off or on by left-clicking on the button in the lower right corner of the radar. The radar screen can be resized and moved by double clicking near the perimeter of the window and dragging it the desired size and location. Double click again to lock the screen into place.

NOTE: If you close the radar screen it cannot be re-opened when the simulation situation

THE SCREENS

is running. Don't do it!

AIR RADAR SCREEN:

Air radar gives you a visual display of what to expect regarding your traffic load, and will help you formulate a flow plan knowing the in-air location of aircraft around your airport.
The air radar screen functions of font size and moving the ID tag location work the same as the ground radar.
The information shown about each aircraft is:

AIRCRAFT ID
ALTITUDE | AIRSPEED

• T: represents the aircraft's location
• Altitude: 100's of feet (ex, 11 = 1100 feet)
• Airspeed: 10's of knots (ex, 16 = 160 knots)

VIS HDG ON/OFF toggles the representation of aircraft movement on the radar screen.

VIS MAP ON/OFF toggles the representation of terrain and other obstacles on the radar screen. These show as inverted triangles. Obstruction avoidance is the concern of the Approach/Departure controllers, not you.

NOTE: If you close the radar screen it cannot be re-opened when the simulation situation is running. Definitely don't do it!

COMMAND SCREEN:

This screen is where you interact with aircraft in your air and ground space. It is here that you will send and receive commands. Looking at the screen, you will find several items of interest:

CMD line: where your commands are displayed prior to transmission.

SEND button: to the very right of the CMD line. Pressing SEND will transmit your commands. Command will also be transmitted by pressing the keyboard ENTER key.

HIS window: HIS (history) keeps are record of communication received from and sent to aircraft. The window will also alert you when improper syntax is entered. When you see SYNTAX ERROR, it means you have entered a command in a fashion not recognizable by Tower.

CMD/DEL button: permits you to deletes all text in the CMD line without needing to press the backspace key.

TIME: below the CMD/DEL button Coordinated Universal Time (UTC) is reported.

HIS button: pressing this will clear all entries in the HIS window. This is to be avoided until you become a proficient controller it is easy to forget exactly who it is you commanded to go where. The Command Screen can be resized and moved by double clicking near the perimeter of the window and dragging it the desired size and location. Double click again to lock the screen into place.

THE SCREENS

HLP line: the Help line will display a short list of acceptable commands based on what has already been entered into the CMD line. The correct format (syntax) for acceptable commands is also displayed.

NEXT TRAFFIC button: Rather than time acceleration, this button initiates the sequence for the next arrival/departure. You will not know which until the pilot contacts you. The number to the right indicates how many requests you've made for the next traffic to appear. THE RESULTS ARE NOT INSTANTANEOUS!

Along the bottom of the command screen click buttons that control the text displayed in the command screen:

SINGLE AIRCRAFT ON/OFF – will display only the command between the tower and the aircraft who's ID is typed in the CMD line in the history window.

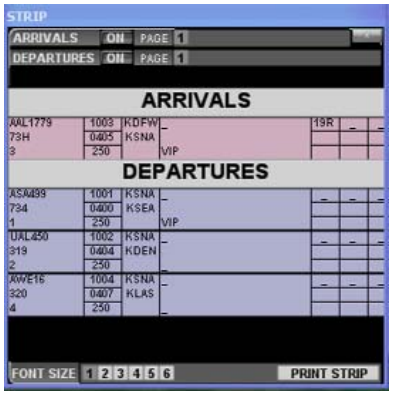
HIDE/SHOW SEND COMMANDS – with add/remove the commands you have sent aircraft from the history window. When choosing the HIDE option only aircraft acknowledgements will be displayed.

HIDE/SHOW SYNTAX ERROR – will add/remove error messages from the history window.

PRINT COMMANDS – the shortcut key commands currently assigned will be sent to the printer connected to your computer.

DELETE HISTORY – after clicking this button you will get a YES/NO option. Choosing yes will remove all commands showing in the history window.

NOTE: If you close the Command Screen it cannot be re-opened when the simulation situation is running. Oh boy, you really don't want to do it!



STRIP SCREEN:
This is a visual representation of your "to do" list. It is divided into two sections: Arrivals and Departures.

By left-clicking the ON/OFF buttons and page numbers you can expand and contract the strips displayed on the screen.

As flights come under your control their strip is presented on the bottom of each section. The strips present a you information for each flight :

Deciphering an ARRIVAL slip:
• AAL1779 – Aircraft call sign (in this case American Airlines flight 1779)
• 73H – Equipment type (in this case a Boeing 737-700; see Aircraft Identification Codes for more information)
• 4 – An arbitrary number assigned by the program that generates the strips
• 1003 – A computer generated arbitrary number
• 0405 – The time of arrival, reported as UTC
• 250 – The requested flight level of the aircraft (in this case FL250)
• 19L – The anticipated arrival runway (in this case runway 19 left)

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COMMANDS / SYNTAX

Deciphering a DEPARTURE slip:
• ASA499 – Aircraft call sign
• 734 – Equipment type (in this case a Boeing 737-400; see Aircraft Identification Codes for more information)
• 1 – An arbitrary number assigned by the program that generates the strips
• 1001 – A computer generated arbitrary number
• 0400 – The time of departure, reported as UTC
• 250 – The requested flight level of the aircraft (in this case FL250)
• ** – The anticipated departure runway (in this case the runway is unassigned)

The Strip Screen can be resized and moved by double clicking near the perimeter of the window and dragging it the desired size and location. Double click again to lock the screen into place.

The Command strip, the Radars and the Flight strip windows can be re-opened by the following commands :

F2 - Command Window
F3 - DBRITE
F4 - ADIRS
F5 - Flight Strip

COMMANDS/SYNTAX

Below are all available commands for controlling aircraft in Tower. Commands are divided into ground and airborne types and are followed by their default keystrokes. Remember the keystrokes can be customized. Should you find it more convenient, you may always type in your commands instead of using the shortcuts, as long as you stick to the proper syntax! In the event that you get a "syntax error" message be certain to look at the HLP line for suggestions on appropriate commands and syntax.

Common causes of syntax errors:
• Not typing an aircraft's full ID (i.e., Alaska flight 289 is ASA289).
• Failing to put a space between commands.
• Typing 'V' instead of VIA.
• Runway are identified with a minimum to numbers (ex, runway 9 is entered 09).
• When more than one runway exists be sure to enter the exact runway designation (i.e. runway 18 left is entered 18L).

Remember:
• To transmit your instructions to a pilot you must either press the ENTER key on the keyboard, or click SEND button on the Command Screen.
• You cannot control an aircraft's airborne movement until its pilot states, "with you."
• You cannot control an aircraft's ground movement until its pilot states, "ready to taxi."

THE COMMANDS LIST IS DETAILED
ON THE LAST PAGE OF THE MANUAL !

**DESCRIPTIONS OF
AIRCRAFT REACTIONS TO COMMANDS**

GROUND COMMANDS:
AFTER DEPARTURE FLY [XXX] (ALT 3): after takeoff the pilot will turn aircraft to the heading defined. NOTE: headings must be stated in a three digit format – 90 degrees is typed 090.

CLEARED FOR IMMEDIATE TAKEOFF (CTRL Y): pilot will not hold short after completing taxi to the active runway. Instead, the pilot will enter runway and being takeoff roll upon reaching the center line.

CLEARED FOR TAKEOFF (CTRL T): pilot will enter runway and takeoff. If pilot had been told to TAXI INTO POSITION AND HOLD, aircraft will not begin takeoff roll.

CONTINUE TAXI (ALT 7): required to have pilot resume taxi after being told: HOLD YOUR POSITION.

FOLLOW COMPANY (CTRL 5): pilot will follow aircraft of same company name (ie, Air France will follow Air France) to the lead aircraft's assigned runway by the same assigned taxiways.

HOLD SHORT (CTRL R): pilot will stop aircraft at crossing taxiway intersection or runway and await further instructions.

HOLD YOUR POSITION (ALT 8): pilot will immediately stop aircraft's movement and await further instructions.

HOLD SHORT OF RUNWAY [XXX] (ALT R): pilot will stop aircraft prior to entering or crossing defined runway.

HOLD SHORT OF TAXIWAY [XXX] (ALT T): pilot will stop aircraft prior to crossing or entering defined taxiway.

OR TAXI OFF THE RUNWAY (CTRL O): Used in conjunction with CLEARED FOR IMMEDIATE TAKEOFF. If given the command CLEARED FOR IMMEDITATE TAKEOOF OR TAXI OFF THE RUNWAY the pilot will either takeoff, if able, or taxi off the runway.

RUNWAY (CTRL 2): shortcut to enter the 'runway' into command screen's CMD line.

TAXI IMMEDIATELY: (CTRL I): Synonym to TAXI WITHOUT DELAY. As fast as she can the pilot will taxi to the endpoint of the taxi command given previously by the controller.

TAXI TO RUNWAY [XXX] (CTRL 3): pilot will taxi to the defined runway by the shortest route. If you wish the aircraft to follow a specific route you must use the VIA command and define the specific taxiway sequence.

TAXI TO TERMINAL (CTRL 6): after aircraft has exited landing runway and requested "taxi to terminal" this command will direct pilot to taxi to arrival by the shortest route. If you wish the aircraft to follow a specific route you must use the VIA command and define the specific taxiway sequence.

TAXIWAY (CTRL 1): shortcut enters the word 'taxiway' into command screen's CMD line.

TAXI WITHOUT DELAY (CTRL 7): Synonym to TAXI IMMEDITELY. As fast as she can the pilot will taxi to the endpoint of the taxi command given previously by the controller.

TAXI INTO POSITION AND HOLD: pilot will move aircraft onto active runway but will not begin takeoff roll.

TAXI INTO POSITION AND HOLD TRAFFIC LANDING AT RUNWAY [XXX] (CTRL 9): pilot will move aircraft onto the active runway but will not begin its takeoff roll. The information about the landing aircraft provides the pilot with the controller's reason for the hold command.

TAXI INTO POSITION AND HOLD TRAFFIC DEPARTING AT RUNWAY [XXX] (CTRL 0 (zero)): pilot will move the aircraft onto active runway but will not begin the takeoff roll. The information about the departing aircraft provides the pilot with the controller's reason for the hold command.

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COMMANDS / SYNTAX

TRAFFIC DEPARTING ON [XXX] (CTRL W): information message that causes no specific pilot reaction.

TRAFFIC INBOUND ON THE TAXIWAY (CTRL E): information message that causes no specific pilot reaction.

TRAFFIC LANDING ON [XXX] (CTRL Q): information message that causes no specific pilot reaction.

VIA: command required when directing a pilot to follow specific taxiways to the assigned terminal gate after landing, or a specific runway for departure.

AIRBOURNE COMMANDS:
CLEARED TO LAND (CTRL U): clears the pilot to land. After landing the aircraft will exit the runway and request permission to taxi.

CONTACT DEPARTURE (ALT D): directs pilot to contact departure for further ATC control to destination. Once you issue this command the aircraft is no longer under your control and will clear from your radar and strip screens.

DEGREES (CTRL N): shortcut to enter the 'degrees' into command screen's CMD line.

GO AROUND (ALT 5): If it apparent that proper runway separation cannot be achieved and neither aircraft's traffic pattern can be adjusted, it will be necessary to cancel landing clearance for one of the arriving aircraft. The controller should give instructions to the pilot to go around followed by directions to re-enter the pattern.

GROUND PATH VISIBLE (ALT 6): Syntax: GROUND PATH VISIBLE ON / GROUND PATH VISIBLE OFF. Turns on/off ground path visibility for a specified aircraft.

REPORT [XXX] (CTRL L): you have three options for asking information from the pilot:
POSITION: pilot will report aircraft position as "XXX miles XXX from the airport." Example report: 5 miles southeast from the airport.
HEADING: pilot will report back current heading in degrees.
AIRSPEED: pilot will report back current airspeed in knots.

REPORT POSITION (CTRL Z): used to aid the controller in spacing and identifying aircraft by having pilots broadcast position reports.

REPORT AIRSPEED (CTRL C): used to aid the controller in spacing by having pilots broadcast their aircraft's current airspeed.

TURN LEFT (CTRL V): a shortcut to enter TURN LEFT into the CMD line. You will need to complete the phrase with HEADING [XXX] or [XXX] DEGREES commands.

TURN RIGHT (CTRL B): a shortcut to enter TURN RIGHT into the CMD line. You will need to complete the phrase with HEADING [XXX] or [XXX] DEGREES commands.

XXX REMOVE AIRPLANE (ALT+Q):
this command removes any unwanted airplane on the ground.

EXAMPLES OF
MULTIPLE COMMAND STRINGS:
When controlling in Tower all commands must be preceded with an aircraft ID. For the examples below the preceding aircraft ID has been omitted. Be certain to place a space between commands.

TAXI TO RUNWAY [XXX] VIA TAXIWAY [XXX] AND [XXX] AND [XXX]

TAXI TO TERMIAL VIA [XXX] AND [XXX]

TAXI TO RUNWAY [XXX] VIA [XXX] AND [XXX] HOLD SHORT OF RUNWAY [XXX] TRAFFIC LANDING ON [XXX]

Not for use in real aviation.

THEORY BEHIND AIR TRAFFIC CONTROL

TAXI TO RUNWAY [XXX] VIA [XXX] AND [XXX] HOLD SHORT OF RUNWAY [XXX] TRAFFIC DEPARTING AT RUNWAY [XXX]
Using this list of commands, you are able to control aircraft both on the ground and in the air. Always bear in mind that these birds are full of not only impatient flight crews and paying customers, but perhaps more to the point, they are all burning jet fuel. The longer you take getting your charges to and from the stand, the more the airlines must spend keeping the turbines spinning. In addition to the obvious safety issues, you must avoid becoming a monetary liability as well!

THEORY BEHIND AIR TRAFFIC CONTROL

Tower assigns you the task of providing safe passage to all aircraft within your control space. This is accomplished through issuing commands to your charges that assure adequate aircraft separation both in-air and on-ground.

Tower is programmed to follow, more or less, United States of America Federal Aviation Administration (FAA) and European (EUROCONTROL) guidelines for traffic control. While the command structure simulation is not completely accurate to "real world" procedures, instructions sent to aircraft are designed to apply to a broad set of applicable global procedures.

Tower is programmed so that all aircraft fly IFR. As such, all aircraft maintain a radio for two-way communication and carry equipment to correctly report their position, speed and altitude on the air and ground radar screens. Tower also places you simultaneously in two controller positions: Tower and Ground Controller.

Air traffic control towers are operated for the purpose of providing separation to aircraft using the airport. The primary responsibility of the tower controller is to ensure sufficient runway separation exists between landing and departing aircraft. Other responsibilities include relaying Instrument Flight Rule (IFR) clearances, providing taxi instructions and directing airborne aircraft within the vicinity of the airport.

The Ground Controller is responsible for the safety of aircraft that are taxiing on taxiways or inactive runways. To ensure the ground controller is always communicating with the correct pilot, the aircraft's position must be positively determined before issuing instructions. This may be done through the use of visual observation, a pilot report or ground radar. Once this determination has been made, communication should include the aircraft identification, the route to be used while taxiing and any restrictions applicable to the pilot.

We'll now take a close look at how all of the smaller details of Tower work.

Controlling Departures
Take, for example, the situation in which you are controlling at KORD and contacted by an aircraft that is currently at the gate. United Airlines Four Five Zero has boarded, received Ground clearance, has her engines started and is ready to taxi. This happens automatically, with no input from you. The pilot contacts you (the Tower controller) and advises, "UAL Four Five Zero, ready for taxi." You will hear this and see it on your Command Line window.

Looking at your Ground Radar screen, you see that as the icon for United Four Five Zero is highlighted, in so doing identifying it as the communicating aircraft. A quick look out the window and at the radar finds no conflicting traffic in the vicinity, and you elect to grant the pilot permission to taxi to the active runway of 14 right (14R). There are multiple ways for you to issue the taxi

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THEORY BEHIND AIR TRAFFIC CONTROL

command. To begin you may enter the aircraft's call sign by:
• Type into the Command Line, "UAL450"
• Double left-click on the icon in the ground radar scope.
• Left-click on the flight's flight strip on the Strip Screen.

After putting a space after the aircraft ID you can:
• Type into the command line, "TAXI TO RUNWAY 14R"
• Use the shortcut key combination of CTRL 3; and type 14R.

After you have entered the entire taxi clearance into the CMD line hit the Enter key on the keyboard, or left click on "SEND" on the Command Window, to transmit your directions to the United pilot. **REMEMBER: Do not forget to type a SPACE between each individual portion of the commands you input on the Command Line** or you will receive a syntax error message from Tower!

Having entered and sent your command the pilot will confirm your instructions and proceed accordingly. While he is underway, you may follow his progress on the Ground Radar.

One of the primary responsibilities of the ground controller is to prevent a runway incursion. If an aircraft must cross or enter an active runway, the ground controller must first give permission for the pilot to do so. In similar fashion, pilots must not be permitted to cross/enter taxiways when doing so could interfere with traffic already on the taxiway. In these circumstances, using the 'HOLD SHORT OF RUNWAY", "HOLD SHORT OF TAXIWAY" and "HOLD YOUR POSITION" commands are issued by the controller.

Once UAL450 reaches the hold short line for runway 14R the pilot will call for takeoff clearance. Telling aircraft it is OK to takeoff as soon as they arrive at the runway isn't all there is to being a controller. You role is to assure adequate aircraft separation, and provide a reasonable and safe flow of traffic away from the airport that avoids arriving aircraft. This is done by properly spacing these inbound aircraft (discussed later) AND while also sequencing departures into the traffic flow.

Aircraft separation is generally defined by the phase of flight the aircraft is currently in (takeoff, climb, cruise, descent, and landing) and the size of the aircraft. Aircraft are categorized according to weight:
• Cat I = under 41,000 pounds gross weight (small).
• Cat II = between 41,000 and 255,000 pounds gross weight (large).
• Cat III = over 255,000 pounds gross weight (heavy).

As you are the controller you are responsible for assuring safe separation distances. As such you must know the category of each aircraft is assigned. With this knowledge the distance between takeoffs can be figured.

Prior to giving the clearance to takeoff you must satisfy the following aircraft category criteria:

When the aircraft wanting to takeoff is CAT I and the aircraft taking off prior is CAT I the departing aircraft is past the departure end of the runway; OR the prior aircraft has left the runway surface and is at least 3000' ahead of the aircraft wishing to take-off.

When the aircraft wanting to takeoff is CAT I and the aircraft taking off prior is CAT II the prior aircraft has left the runway surface and is at least 3000' ahead of the aircraft wishing to take-off.

When the aircraft wanting to takeoff is CAT II and the aircraft taking off prior is CAT I or CAT II the prior aircraft has left the runway surface and is at least 4500' ahead of the aircraft wishing to take-off.

When the aircraft wanting to takeoff is CAT III and the aircraft taking off prior is CAT I or CAT II the prior aircraft has left the runway surface and is at least 6000' ahead of the aircraft wishing to take-off.

After deciding aircraft category requirements you must not allow an aircraft to take-off until landing aircraft are clear of the runway.

You must also keep the following in mind when controlling airports with parallel runways: simultaneous takeoffs are only allowed if the runways are separated by more than 2500'. Airports can receive an exemption to this rule.

Adding to the fun, if you are controlling an airport with runways that intersect another active runway or taxiway, the controller must ensure the pilot does not begin the takeoff roll until at least one of the following conditions exist:

1. A preceding landing aircraft has:
    a. taxied off the landing runway
    b. completed the landing roll
    c. passed the intersection
2. A preceding, departing aircraft is airborne and has passed the intersection, or is turning prior to the intersection to avoid a conflict.

You are also allowed to use **anticipated separation**. Where you are reasonably assured that correct separation will exist air traffic controllers are permitted to issue both anticipated arrival and departure clearances.

After reviewing the above criteria you make the decision that UAL450 can takeoff. To give the pilot clearance you can type or use one of the shortcuts to enter the aircraft ID into CMD line and then:

type, "CLEARED FOR TAKEOFF"
use the shortcut key sequence of CTRL T

After you have entered the entire takeoff clearance into the CMD line hit the Enter key on the keyboard, or left click "SEND" on the Command Window to transmit your directions to the United pilot.

UAL450 will repeat his clearance, and proceed to depart. You may follow his progress visually and with the ground radar. Once airborne UAL450 will clear from the ground radar screen and show on the air radar screen. Once airborne, you still have control until you advise the pilot to contact departure.

Normal practice is to transfer control to departure as soon as possible to reduce workload. It is your responsibility not to clear the next aircraft for takeoff until the departing aircraft is safely away. Once you are certain United 450 is clear, you can instruct the pilot to contact Departure. As with ground control you can type or use one of the shortcuts to enter the aircraft ID into the CMD line. Then type, "CONTACT DEPARTURE"; or use the shortcut key combination ALT D. To transmit the command hit the keyboard ENTER key, or left-click the SEND button on the Command Screen.

UAL450 will acknowledge the command and the aircraft's ID tag on the radar screen becomes a "T", indicating a departing flight. Once the Departure controller has accepted the flight, the data block will change to only the "T", and Departure will continue to direct the flight. The flight strip for UAL450 will clear from the Strip Screen.

The information just covered is a primer of the many types of commands you may use when controlling in Tower. As your basic control skills improve you are encouraged to read the real world resources about air

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DEFINITIONS

traffic control and incorporate these in your controlling. A short list of real-world resources are listed in the Real World Air Traffic Control Resources section of this manual.

Controlling Arrivals
The trick is to wait until the pilot contacts you before issuing a command, even if you see his strip on your board, or see his radar return on your radar screen. Tower will direct the aircraft to final approach (you will not see or hear these commands). When on final the pilot will say, "With you, <airline/aircraft ID>". Only after being contacted by arriving aircraft can you grant the aircraft clearance to land; or direct the pilot appropriately to avoid any unpleasant collisions or hair-raising "near misses".

Approach control is responsible for instructing aircraft to keep adequate aircraft separation; and providing a reasonable and safe flow of the airport's landing traffic that avoids departing and arriving traffic. Your role is to assure that it is safe for aircraft to land. There is a Golden Rule: No aircraft may land when another aircraft is on the runway.

As with departure control you can enter control information into the CMD line by:
• typing full commands
• using the available shortcut key combinations
• double left-click on the radar screens to enter the aircraft ID
• left-click on the aircraft's arrival strip to enter the aircraft ID.

You are allowed to use **anticipated separation**. Where you are reasonably assured that correct separation will exist air traffic controllers are permitted to issue both anticipated arrival and departure clearances.

Remember, even though the aircraft has touched down, you are still in control. Issue the pilot taxi instructions as you did with the Departures, only this time you're directing the aircraft to the terminal.

There is, for your enjoyment, the issue of "Go Arounds". Whether from inadequate visibility at the decision height, a runway obstruction or whatever else, it does on occasion happen that the pilot aborts his attempt at landing. You must deal with this very quickly! Contact the pilot and advise him to contact Departure, and from there he will be directed back into the landing pattern (not by you) and will once again announce "With you". Land him as usual from there. Failure to direct the aircraft to departure will result in his continuing to fly off, never to be heard from again. You will, of course, be penalized for this serious breach of procedures!

The information just covered is a primer of the many types of commands you may use when controlling in Tower. As your basic control skills improve you are encouraged to read the real world resources about air traffic control and incorporate these in your game controlling. A short list of real-world resources are listed in the Real World Air Traffic Control Resources section of this manual.

DEFINITIONS

Adequate Separation: Separation between two or more aircraft that presents each with operating space sufficient for safe navigation, commonly defined by the FAA or controlling authority.

Air Traffic Control Handbook (FAAH 7110.65): The FAA publication that delineates the procedures to be used by FAA air traffic controllers when performing their duties.

Anticipated Separation: A procedure whereby the controller issues instructions to two or more aircraft based on the presumption that they will remain separated.

Data Block: An alphanumeric display on a radar presentation that normally includes the aircraft's identity and altitude and may also include its ground speed and destination airport.

Departure Control: A function of an approach control facility that provides air traffic control service to departing aircraft.

Inactive Runways: Runways not declared active by the local controller. The responsibility of the ground controller.

Initial Approach Fix (IAF): The fixes depicted on navigation charts that identify the beginning of the initial approach segment of an instrument approach procedure.

Instrument Flight Rules (IFR): The rules that govern the conduct of aircraft during instrument flight.

Instrument Landing System (ILS): A precision approach and landing aid that normally consists of a localizer, a glide slope, marker beacons and an approach light system.

International Air Transportation Association (IATA): this organization of airlines works with national airspace governing groups to define safe airspace utilization. Airports working with IATA are given a three digit identification code.

International Civil Aviation Organization (ICAO): a United States of America government agency responsible for developing and systems for safe navigation and air traffic control. Airports working with ICAO are give a four digit identification code.

Marker Beacon: An electronic navigation facility that transmits a low intensity coded signal, typically used as part of an instrument landing system.
Minimum Descent Altitude (MDA): The lowest altitude to which descent is authorized during a non precision (ie. not an ILS approach) instrument approach procedure.
Minimum En Route Altitude (MEA): The lowest published altitude between navigational fixes that provides both obstacle clearance and adequate navigation radio reception.

Missed Approach Point (MAP): The point where the missed approach procedure will be flown by the pilot if the required visual references for landing do not exist.

Non-Precision Approach: A standard instrument approach procedure in which no electronic glide path is provided.

Terminal Radar Approach Control (TRACON): the radar air traffic control facility associated with the control tower to provide aircraft with safe arrival and departure routings in the airport vicinity.

UTC: Coordinated Universal Time is also known as Greenwich Mean Time (GMT). UTC is the local time in Greenwich, England; the location of the Prime Meridian.

Visual Flight Rules (VFR): Rules that govern the procedures for conduction flight under visual conditions.

Visual Separation: A means employed by controllers to separate aircraft in terminal areas. To utilize visual separation, either the controller or one of the pilots visually separates the involved aircraft.

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THINGS TO REMEMBER WHEN CONTROLLING

THINGS TO REMEMBER WHEN CONTROLLING

• You may always enter commands using either the shortcut keys or entirely by keyboard input. Depending upon your keyboard skill, you will find yourself entering your commands at an ever faster and accurate rate with practice. Of course, entering the right command at the right time is the real challenge.

• You must type in "VIA" on the keyboard.

• Place a space between commands on the Command Line.

• When you receive a "syntax error", use the HELP line above for the correct sequence of entering the command.

• You cannot control aircraft movement until the pilot has contacted you. Aircraft approaching the airport will call "with you"; aircraft on-ground will call "ready to taxi."

• You may always alter the shortcut keys to suit your taste. Choosing a command that is logical to you will greatly enhance your ability to recall them.

• Anti-aliasing is supported on a hardware level. If you wish to enable this, you must do so via your video card software.

• You as controller will be responsible for determining the arrival/departure patterns to be used. There is a wealth of charts available on the web to assist you in this regard.

• Due to programming limitations, precise gate placement is impossible. As above, you must refer to your airport maps in order to determine optimum pathways to/from the gates, parking and runways. These will change depending on which runways are active.

• In Tower you are controlling ground operations, landings and takeoffs. You are not responsible directing aircraft through airport SID and STAR procedures. Tower will control aircraft until they are on final approach. After aircraft takeoff you to transfer control to departure so Tower can direct the pilots away from the airport's airspace.

• Please remember this is a game, and as such not meant to duplicate actual procedures in the Tower setting! It is not meant as a training vehicle for aspiring controllers (although it may certainly be used as such).

Practice, practice, practice! Controllers do not develop over night, nor should you expect your skills to do so. Start small and slow, and as you gain confidence and an understanding of appropriate traffic flow, move to the more challenging scenarios. The syntax used in "Real World" controlling is very specific and standardized for a reason. Before long, you will be issuing commands like a controller without having to think about it.

If you give yourself the opportunity, this simulation will become one of the most anxiety inducing, hair raising and perspiration inspiring "games" that you have ever enjoyed!

TECHNICAL SUPPORT

TECHNICAL SUPPORT

Monitor Resolution

Should you happen to select a screen resolution that is higher than the maximum of your monitor, you will greatly reduce your frame rates! **If you find your rates suffering, check this first!** Either run the sim in full screen mode, or use only the maximum resolution that is supported by your monitor.

To improve image quality, we recommend to increase the ANTI-ALIASING option from your video card settings. More information can be found from your computer retailer or video card manual. Increasing Anti-Aliasing may decrease performances.

Obtaining Support for this Software

On-line support from feelThere is located at **http://forum.iemit.com**

In order to access and post messages on the 'feelthere Tower simulator' forum you must create a user account by clicking on 'register'.

Answers to frequently asked questions (FAQs) and updates can be found through Wilco Publishing Support page at **http://www.wilcopub.com**

TOWER SIMULATOR OFFICIAL SITE : http://www.towersimulator.com

REAL WORLD AIR TRAFFIC CONTROL RESOURCES

Airport Internet Home Pages (at time of publication) :
• John Wayne Airport Orange County: http://www.ocair.com/
• Princess Juliana International Airport: http://www.pjiae.com/main.html
• Chicago O'Hare International Airport: http://www.ohare.com
• Charles de Gaulle International Airport: http://www.aeroportsdeparis.fr/ADP/en-GB/Passagers/
• Munich International Airport (Franz Josef Strauss International Airport): http://www.munich-airport.de

Listings of Aircraft and Airline Identification Codes :
• ICAO - Aircraft Type Designators: http://www.icao.int/anb/ais/8643/index.cfm
• Airline Codes: http://www.airlinecodes.co.uk/

Material on Real World Air Traffic Control :
The European Organization for the Safety of Air Navigation (EUROCONTROL):
• General Information: http://www.eurocontrol.be
• ATC: http://www.eurocontrol.be/corporate/public/standard_page/cb_airtraffic_controller.html
• Library: http://www.eurocontrol.int/eatm/public/standard_page/Library.html

United States of America Federal Aviation Administration (FAA):
• General Information: http://www.faa.gov
• ATC: http://www.faa.gov/airports_airtraffic/air_traffic/publications/atpubs/ATC/Index.html
• Library: http://www.faa.gov/library

Any edition of Michael S. Nolan's Fundamentals of air traffic control published by Brooks/Cole Publishing Company.

Brenlove, M.S. (1983). Vectors to spare: The life of an air traffic controller. Ames, Iowa: Iowa State University Press.

TOWER EDITORS

TOWER EDITORS

As you gain experience using Tower you may change the airport environment by modifying the types of aircraft, airline schedules and airline gate assignments.

Using the editors requires you to have .NET Framework version 2.0 installed on your computer. For information on downloading this application see :
http://msdn2.microsoft.com/en-us/netframework/aa731542.aspx

NOTE: feelThere nor Wilco Publishing warrantee Microsoft Corporation's .NET Framework software, how it will perform on your computer, nor it's free availability.

IMPORTANT: feelThere nor Wilco Publishing warrantee any schedules created and shared using these editors.

Air Traffic

The schedule for an airport's flights is modified in the .scd schedule files using the supplied Tower Schedule Editor application. The default schedule files can be found for each airport in :
FeelThere Tower\Tower\data\<airport ID>\scripts\<airport ID>.scd

It is recommended you backup the original data files before editing.

To open an airport's air traffic file click the 'Open' button on the lower left corner of the editor window. The 'Close' button will end editing of the opened file while keeping the editor open. 'Save' does exactly what it says – saves the air traffic file being edited. 'Exit' shuts down the editor.

By clicking on the Departures and Arrivals tabs you can view, modify and edit the specific traffic types for the selected airport. The airport being modified is listed in IATA format in the 'Airport' window. The 'Schedule Name' window allows you to create a specific title for your creations.

To edit flight information be sure you use the correct syntax so Tower understands what you have created. Failing to follow the syntax rules may result in unexpected reactions from the simulator.

Airport Column: for departures this is the destination airport; arrivals refers to the airport the flight is coming from; and local traffic refers to the airport currently being edited (ie, TNCM local flights only happen at TNCM).

Flight Column: the first two characters are the airline's IATA code (this is displayed as ICAO on the flight strip). After a space the flight number is listed.

Carrier Column: the airline's name.

Time Column: the time that the flight is schedule to depart, arrive and begin its local traffic flight. The times reported in this column are in UTC.

Airplane Type Column: the airframe reference code (see Aircraft Identification Codes).

Painting Column: the file name of the livery to be used (see Aircraft Liveries).

Dep./Arr. dir. Column: the sector the aircraft will depart/arrive at the airport.

VIP Flight Column: if checked the flight will have a VIP designator on it's flight strip.

Terminal Gates

The gate assignments can be modified using the supplied FeelThere Gate Editor application.

Maps of each Tower airport's default gate locations are in the folder named 'airport gate maps'. This folder is located in the TOWER installation directory on your computer's hard drive. These files are in .png format and may be viewed by most graphic editors (i.e., Microsoft Paint).

Aircraft Liveries

Tower allows for users to create new aircraft liveries for the provided aircraft models. Each plane is 'painted' with three files:

• daytime body painting: paintingid_airplanetypeid.body.dds (ie. Continental livery for Boeing 737-300: coa_B7373.body.dds)
• night body painting: paintingidN_airplanetypeid.body.dds (ie. Continental livery for Boeing 737-300: coaN_B7373.body.dds)
• universal wing painting: paintingid_airplanetypeid.wing.dds (ie. Continental livery for Boeing 737-300: coa_B7373.wing.dds)

The .dds files are edited using by various image editor programs. Some examples are:
• Corel Paint Shop Pro (former Paint Shop Pro)
• Adobe Photoshop with .dds capable plugin (for example the NVIDIA plugin)
• Microsoft DirectX SDK DxTex utility.

NOTE: please see the above companies' manuals for how to use their programs. Specifics on how to manipulate images is beyond the scope of this manual.

Generally the .dds format is the standard DirectX texture format.

It is recommended to save the .dds files in "DXT1" format. When you save a .dds file you may be asked to select a subtype for the .dds file. The recommended subtype is the "DXT1" format because of its efficient compression. A smaller texture file will occupy much less space in the memory of the video card and result in improved in-game performance.

The livery files are located in the following location:
FeelThereTower\Tower\data\shapes\planes\airplanetypeid

In order to see your new livery at Tower's airports you must first add the new livery to the livery database using the supplied FeelThere Painting Editor application. You then create the new schedule record as discussed in Air Traffic and Airport Terminal Editors sections of the manual.

The 'Painting' pull-down menu shows all current liveries for the chosen aircraft type. To add a livery choose an Airplane from the pull-down menu and left-click the 'Add new' button. In the pop-up window enter the livery 'paintingid' code used when saving the repaint (ie, the .dds file) followed by the airline name in round brackets. Click 'OK'. A livery can be deleted by choosing repaint in the pull-down menu and left-clicking the 'Delete current' button. Click 'Save' to keep your additions or deletions. The 'Exit' button closes the editor.

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Developed by feelThere
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Published by Wilco Publishing
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KSNA and ORD airport satellite imagery: "Data available from U.S. Geological Survey, EROS Data Center, Sioux Falls, SD."

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KSNA & TNCM - Victor Racz

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Special Thanks To:
Neil Perrin and Soledad Taylor

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Airport history, descriptions and statistics use information collected from on-line sources (including wikipedia.org. airport homepages, airwise.com, worldairportawards.com and www.airports.org) and the development team's personal experiences.

The descriptions of real-world air traffic control procedures and definitions come from:
• EUROCONTROL procedure documents
• Federal Aviation Administration (USA) procedure documents.
• Tower development team's personal experiences.
• Nolan, M.S. (2004). Fundamentals of air traffic control. (4th ed.). Belmont, CA : Brooks/Cole - Thomson Learning, Inc.

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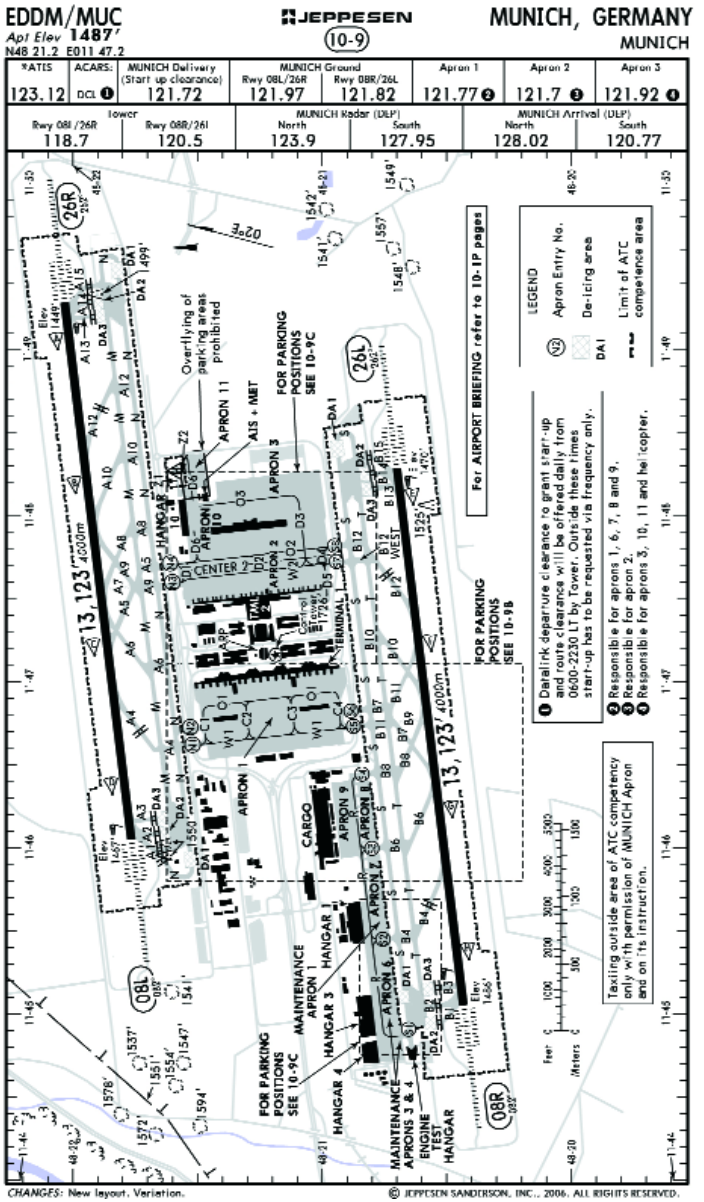
EDDM/MUC
Apt Elev 1487'
N48 21.2 E011 47.2
JEPPESEN
10-9
MUNICH, GERMANY
MUNICH
*ATIS 123.12
ACARS
DCL
MUNICH Delivery (Start up clearance) 121.72
MUNICH Ground Rwy 08L/26R 121.97 Rwy 08R/26L 121.82
Apron 1 121.77
Apron 2 121.7
Apron 3 121.92
Tower Rwy 08L/26R 118.7 Rwy 08R/26L 120.5
MUNICH Radar (DEP) North 123.9 South 127.95
MUNICH Arrival (DEP) North 128.02 South 120.77
13,123' 4000m
Overflying of parking areas prohibited
FOR PARKING POSITIONS SEE 10-9C
APRON 11
ATIS + MET
APRON 3
HANGAR 21
CENTER 2
TERMINAL 1
APRON 2
WEST
FOR AIRPORT BRIEFING refer to 10-1P pages
LEGEND
Apron Entry No.
De-icing area
Limit of ATC competence area
1 Dairlink departure clearance to grant start-up and route clearance will be offered daily from 0600-2230 LT by Tower. Outside these times start-up has to be requested via frequency only.
2 Responsible for aprons 1, 6, 7, 8 and 9.
3 Responsible for apron 2.
4 Responsible for aprons 3, 10, 11 and helicopter.
FOR PARKING POSITIONS SEE 10-9B
CARGO
APRON 9
APRON 12
APRON 1
MAINTENANCE HANGAR 1
HANGAR 3
HANGAR 4
MAINTENANCE APRONS 3 & 4
ENGINE TEST HANGAR
Taxiing outside area of ATC competency only with permission of MUNICH Apron and on its instruction.
CHANGES: New layout. Variation.
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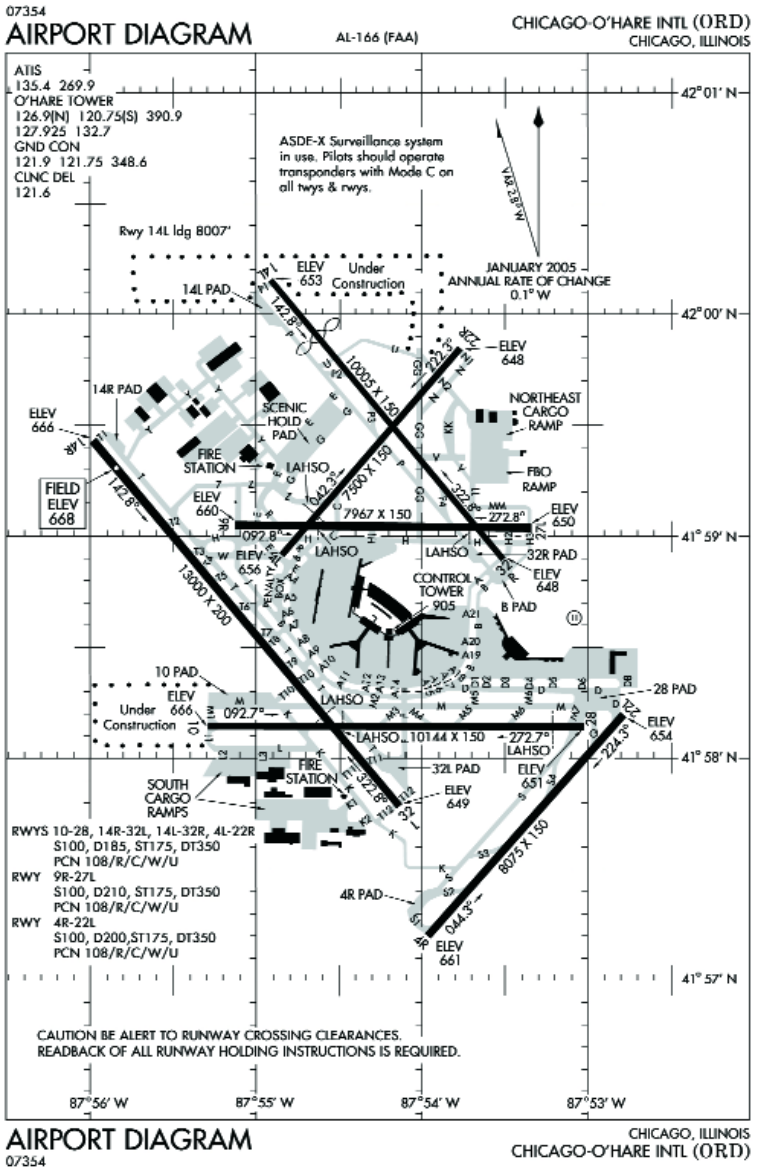

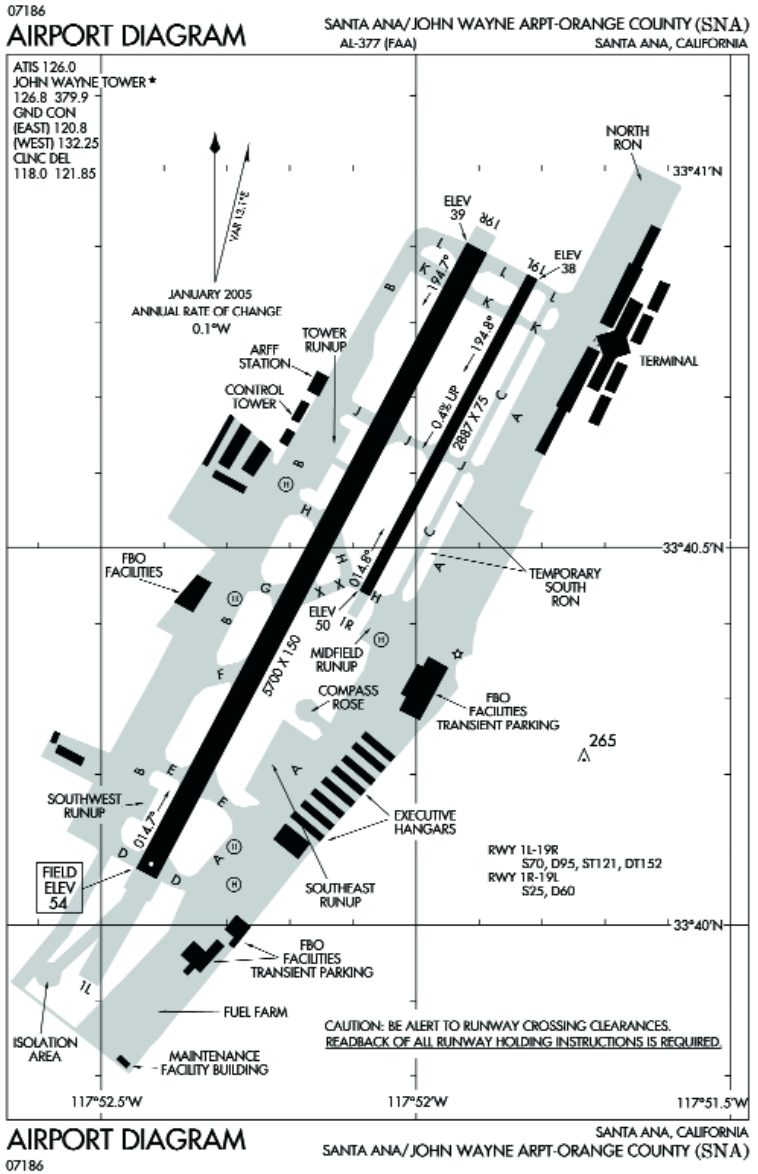

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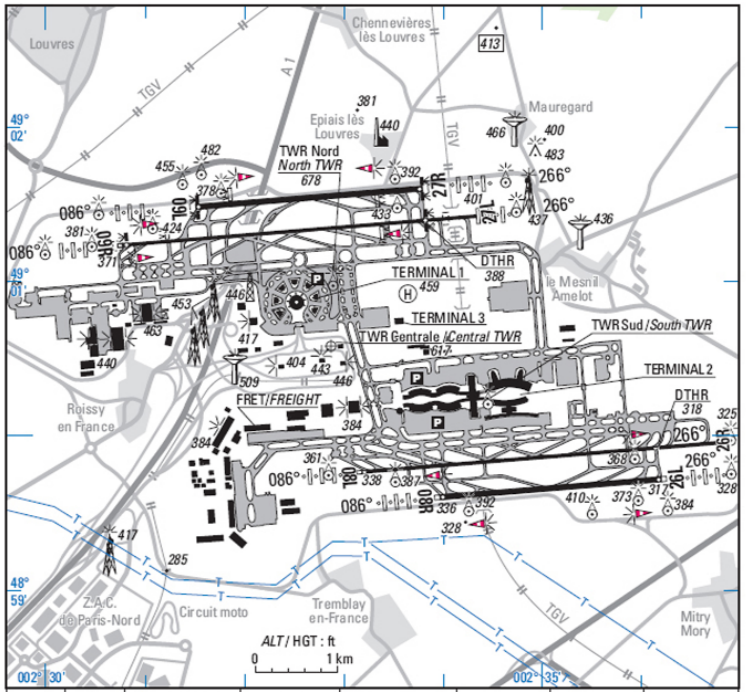
PARIS CHARLES **DE GAULLE**
AD2 LFPG ATT 01



RWY	QFU	Dimensions *Dimension*	Nature *Surface*	Résistance *Strength*	TODA	ASDA	LDA
09L 27R	086 266	2700 x 60	Revêtue *Paved*	77 F/C/W/T	2760 2760	2700 2700	2700 2700
09R 27L	086 266	4200 x 45	Revêtue *Paved*	(1) (2)	4260 4200	4200 4200	4200 3600
08L 26R	086 266	4215 x 45	Revêtue *Paved*	(3) (4)	4275 4275	4215 4215	4215 3615
08R 26L	086 266	2700 x 60	Revêtue *Paved*	68 R/C/W/T	2760 2760	2700 2700	2700 2700

(1) 3600 m 100 R/B/W/T - 600 m 95 F/C/W/T (2) 600 m 95 F/C/W/T - 3600 m 100 R/B/W/T
(3) 3615 m 100 R/B/W/T - 600 m 100 F/C/W/T (*) (4) 600 m 100 F/C/W/T - 3615 m 100 R/B/W/T (*)
(*) Accotements de piste : 15 m de part et d'autre/*RWY shoulders : 15 m on both sides*

Aides lumineuses :
RWY 09L/27R-RWY 09R/27L
RWY 08L/26R-RWY 08R/26L
HI/BI
Ligne d'approche HI 900 m

Lighting aids :
RWY 09L/27R-RWY 09R/27L
RWY 08L/26R-RWY 08R/26L
LIH/LIL
Approach line LIH 900 m

SERVICE DE L'INFORMATION AERONAUTIQUE

AMDT 12/06 **CHG** : Normalisation, aires.

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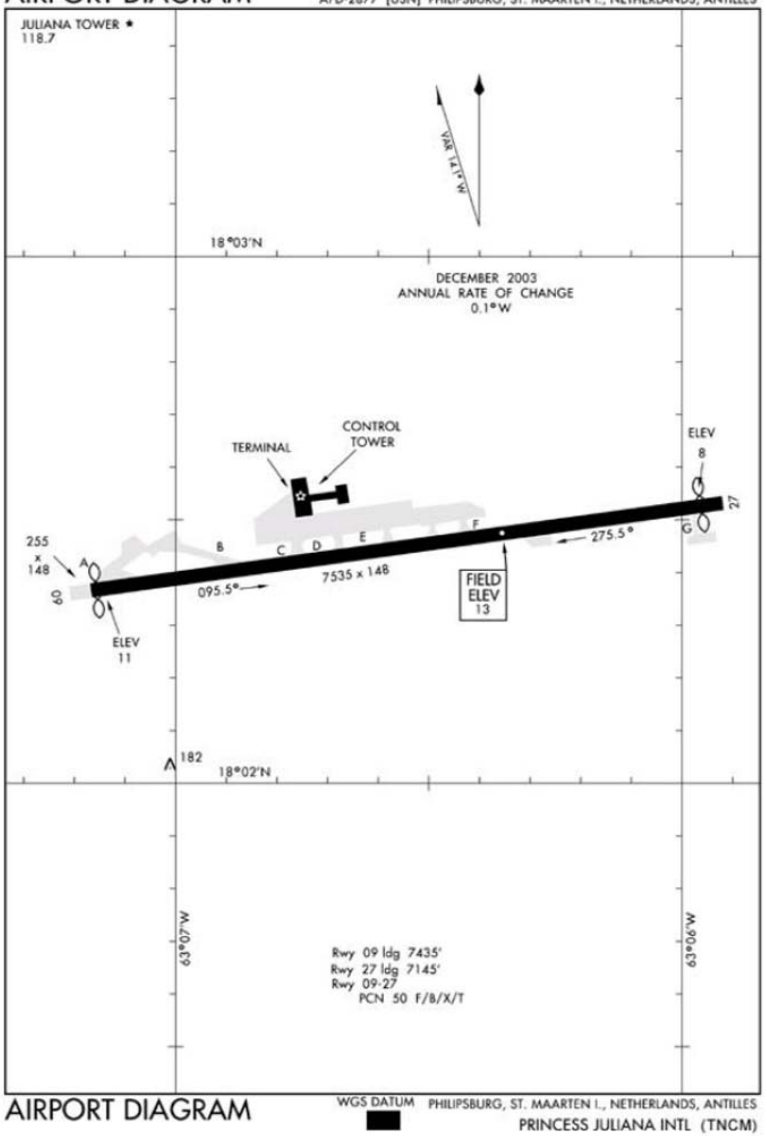
03359
AIRPORT DIAGRAM
PRINCESS JULIANA INTL (TNCM)
AFD-2877 [USN] PHILIPSBURG, ST. MAARTEN I., NETHERLANDS, ANTILLES



AIRPORT DIAGRAM
WGS DATUM PHILIPSBURG, ST. MAARTEN I., NETHERLANDS, ANTILLES
PRINCESS JULIANA INTL (TNCM)

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TOWER SIMULATOR
Useful informations

COMMANDS LIST

The most commonly used commands have been underlined.

Ground Commands:

AFTER DEPARTURE FLY [XXX]	ALT 3
CLEARED FOR IMMEDIATE TAKEOFF	CTRL Y
CLEARED FOR TAKEOFF	CTRL T
CONTINUE TAXI	ALT 7
FOLLOW COMPANY	CTRL 5
HOLD SHORT	CTRL R
HOLD YOUR POSITION	ALT 8
HOLD SHORT OF RUNWAY [XXX]	ALT R
HOLD SHORT OF TAXIWAY [XXX]	ALT T
OR TAXI OFF THE RUNWAY	CTRL O
RUNWAY	CTRL 2
TAXI IMMEDIATELY	CTRL I
TAXI TO RUNWAY [XXX]	CTRL 3
TAXI TO TERMINAL	CTRL 6
TAXIWAY	CTRL 1
TAXI WITHOUT DELAY	CTRL 7
TAXI INTO POSITION AND HOLD	
You must type this command	
TAXI INTO POSITION AND HOLD TRAFFIC LANDING AT RUNWAY [XXX]	CTRL 9
TAXI INTO POSITION AND HOLD TRAFFIC DEPARTING AT RUNWAY [XXX]	CTRL 0 (zero)
TRAFFIC DEPARTING ON [XXX]	CTRL W
TRAFFIC INBOUND ON THE TAXIWAY	CTRL E
TRAFFIC LANDING ON [XXX]	CTRL Q
VIA You must type this command	

Airborne Commands:

CLEARED TO LAND	CTRL U
CONTACT DEPARTURE	ALT D
DEGREES	CTRL N
GO AROUND	ALT 5
GROUND PATH VISIBLE	ALT 6
REPORT [XXX]	CTRL L
REPORT POSITION	CTRL Z
REPORT AIRSPEED	CTRL C
TURN LEFT	CTRL V
TURN RIGHT	CTRL B

RUNWAYS

LFPG

Runway	**09R/27L**	**Runway**	**01R/19L**
Width	148 ft	Width	75 ft
Length	13,780 ft	Length	2,887 ft
Surface	Bit/Conc	Surface	Asphalt
Runway	**09L/27R**		
Width	197 ft		
Length	8,858 ft		
Surface	Bit/Conc		
Runway	**08L/26R**		
Width	148 ft		
Length	13,829 ft		
Surface	Concrete		
Runway	**08R/26L**		
Width	197 ft		
Length	8,858 ft		
Surface	Concrete		

EDDM

Runway	**08R/26L**	**Runway**	**10/28**
Width	197 ft	Width	150 ft
Length	13,123 ft	Length	10,144 ft
Surface	Concrete	Surface	Concrete
Runway	**08L/26R**	**Runway**	**14L/32R**
Width	150 ft	Width	150 ft
Length	13,123 ft	Length	10,005 ft
Surface	Concrete	Surface	Asphalt

TNCM

Runway	**09/27**	**Runway**	**14R/32L**
Width	148 ft	Width	200 ft
Length	7,708 ft	Length	13,000 ft
Surface	Asphalt	Surface	Concrete

KSNA

Runway	**01L/19R**
Width	150 ft
Length	5,700 ft
Surface	Asphalt

KORD

Runway	**04L/22R**
Width	150 ft
Length	7,500 ft
Surface	Asphalt
Runway	**04R/22L**
Width	150 ft
Length	8,075 ft
Surface	Asphalt
Runway	**09R/27L**
Width	150 ft
Length	7,967 ft
Surface	Concrete